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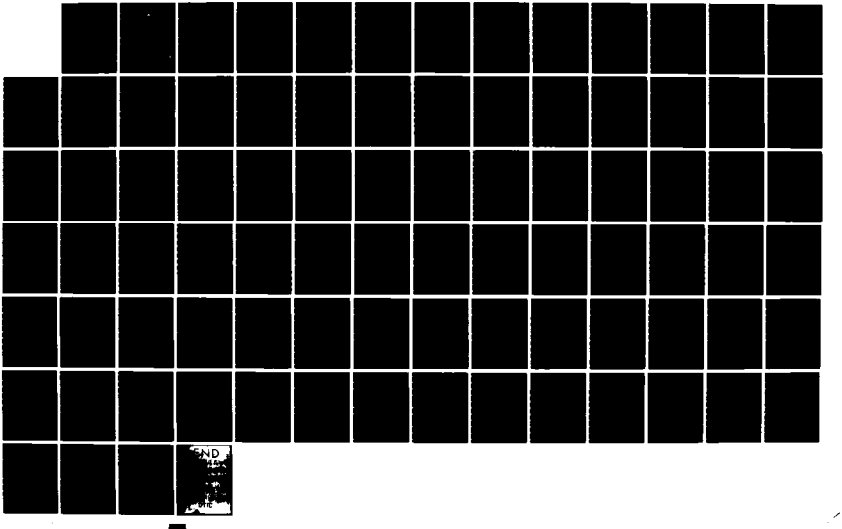

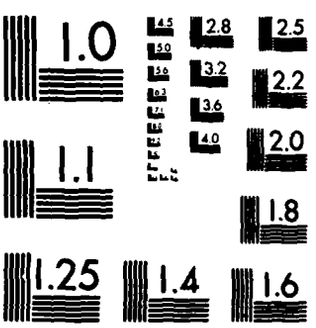
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INVESTIGATION OF ROLE CONFLICT AND ROLE AMBIGUITY FOR JUNIOR CIVIL ENGINEERING OFFICERS

THESIS

Charles R. Howell, Captain USAF
James C. Konyha, Captain USAF

AFIT/GEM/LSM/84S - 11

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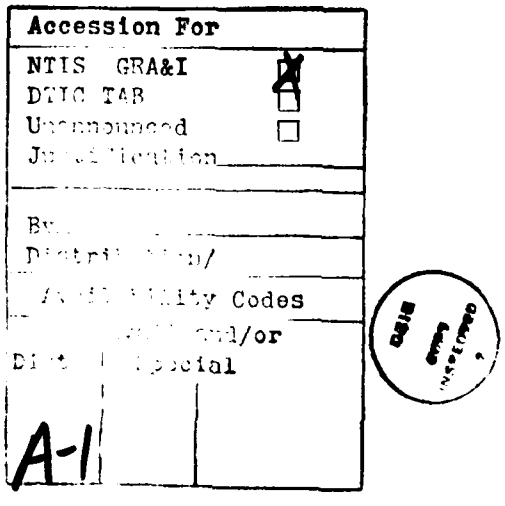

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A random sample of 400 civil engineering officers with five or less years of commissioned service were surveyed to: measure levels of role conflict and role ambiguity stresses, identify personal and organizational factors associated with such stresses, and determine whether a relationship exists between role stress and retention. Survey was composed of a demographics section and four validated questionnaires used in organizational sciences to measure role conflict and role ambiguity, organizational commitment, job involvement, and job satisfaction. Survey questionnaires were factor analyzed and tested for reliability. The dependent variables, role conflict and ambiguity, were correlated with personal and organizational variables; factors found significant were extracted and analyzed for meaningful interpretation. Most respondents acknowledged at least some levels of role conflict and/or role ambiguity stress. Individual factors such as source of commission, degree type, or age were found to have no measureable effect on role stress developed. Officers with prior military service also appeared to be less susceptible to those role stresses. For officers without prior military service, job related stresses did correlate with one's propensity to leave; factors such as "esprit de corps" and quality work environment appeared the most effective means for improving retention related to role stresses.

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INVESTIGATION OF ROLE CONFLICT AND ROLE AMBIGUITY FOR JUNIOR CIVIL ENGINEERING OFFICERS

THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Engineering Management

Charles R. Howell, B.S.
Captain, USAF

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Captain, USAF

September 1984

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Preface

This study measured the job related stresses, role ambiguity and role conflict of junior Civil Engineering officers to determine whether these stresses affected retention, and identified the organizational and individual factors which contributed to roles stress. To maximize survey validity, we used pre-validated questionnaires exclusively. Based on our findings, we made several recommendations for commanders and/or supervisors about how to reduce role stresses for junior Civil Engineering officers.

We express our gratitude to Captain Ben Dilla, our advisor, and Major Al Tucker, our reader, for their guidance and assistence. Last, but not least, we thank our wives Patricia (Howell), and Kathy (Konyha) for their enduring patience and support during our struggles through this AFIT program.

Charles R. Howell

James C. Konyha

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Abstract

A random sample of 400 Civil Engineering (CE) officers with five or less years of commissioned service was surveyed to measure levels of role conflict and role ambiguity stresses, identify personal and organizational factors associated with such stresses, and determine whether a relationship existed between role stress and retention. Surveys were composed of demographics and validated instruments measuring role conflict and ambiguity, organizational commitment, job involvement and job satisfaction. Questionnaires were tested for reliability and factor analyzed. The dependent variables, role conflict and ambiguity, were correlated with personal and organizational variables; factors found significant were extracted and analyzed for meaningful interpretation. Most respondents acknowledged at least some levels of role conflict and/or role ambiguity stress. For officers without prior military service, job related stresses did correlate with one's propensity to leave the service; factors such as "esprit de corps" and quality work environment appeared the most effective means for improving retention related to role stresses.

I. Introduction

Background

Retention of Civil Engineering (CE) officers in the Air Force is a significant problem facing the Air Force Manpower and Personnel Center (5:1; 7:10; 12:10; 13:6; 15:7; 16:30). Technological advances in both the civilian industry and the military have resulted in a tremendous demand for engineers. "One source estimates that the ten top American corporations alone could hire virtually all of the projected US engineering school graduates throughout the 1980's (12:10)." This increased demand for engineers has, over the last five years, left the Air Force with a vacancy rate for O-3's (captains) fluctuating between 24 and 43 percent (TABLE I). On the other hand, manning in the O-1 and O-2 (second and first lieutenants respectively) authorizations averaged over 180 percent for the last 6 years.

It appears that a large portion of the engineers are taking advantage of the many scholarships and commissioning programs to get their education, spend the required four years in the Air Force, and then move on to civilian industry.To counter this trend, the Air Force in the latter part of FY 82 established the Engineering and Scientific Career Continuation Pay in an effort to increase the retention of its engineering and scientific officers.

TABLE I

Manning and Authorization Levels of 55XX Slots (26)

FISCAL YEAR	GRADE	AUTHORIZED BILLETS	ASSIGNED BILLETS	%
78	O-3	812	588	72
	O-1/2	305	496	162
79	O-3	697	517	76
	O-1/2	456	550	121
80	O-3	853	512	60
	O-1/2	355	632	178
81	O-3	945	538	57
	O-1/2	357	723	203
82	O-3	979	625	64
	O-1/2	417	975	209
83	O-3	997	646	65
	O-1/2	424	1066	251

The program so far appears to be successful, but many experts think it is too early to tell because many of those who accepted the bonus already had other service commitments (16:3). Furthermore, with the planned phasing out of this bonus, the value of the bonus as a retention tool is academic.

With or without bonuses, what can CE leaders do to improve retention? Are there factors within the CE working environment which, if controlled, could alter retention rates? Different studies have been completed to determine the cause of the large turnover of junior CE officers. In 1981, Barton (5) found some relationship between the job characteristics of company grade officer positions in base CE and retention of these officers. Barton's recommendations, based on results from the Job Diagnostic Survey, was to redesign the positions that proved to be deficient. Thompson (32) in 1980, found relationships between CE officer attitudes and the supervisor's characteristics, and that the quality of supervision received directly affected the rate of retention. Research by Clayton and Mercer (7) in 1982 identified five major motivational factors which affected CE officers' decision to separate from the Air Force (TABLE II). These same factors were identified by career intent officers as "most dissatisfying".

Purpose

This study will not approach the CE retention problem from a single factor such as supervision, motivation, or job design, but with the general concept of role ambiguity and conflict. Role theory considers many variables that may interact in complex ways to create role stresses.

The key point about these role stresses is that they are dysfunctional; they lessen commitment and reduce job satisfaction, and thus influence turnover.

TABLE II

Motivational Factors for CE Officers (7).

Career Intent
1. Feedback from immediate supervisor
2. Salary
3. Policies and administration
4. Working Conditions
5. Personal Life
Separating
1. Work itself
2. Policies and administration
3. Salary
4. Personal life
5. Additional duties

The junior CE officer is a prime candidate for role stress. The CE enviroment, perhaps more than any Air Force organization has factors which not only create role ambiguity and conflict. but perpetuate it. For example, new CE officers receive no orientation training about the CE mission prior to an assignment. Although all new CE officers are required to attend a formal orientation course within three months after arriving to their first duty

station, many are delayed from three to nine months. The delays are due either to a commander's unwillingness to release a valuable resource or the unavailability of a class slot. With the current captain manning situation at 65% (FY 83), and an increase in the number of military construction projects, supervisors are strained to provide adequate on-the-job (OJT) training for new officers. These new officers nevertheless will be required to fill the voids left by captains and majors who have separated from the Air Force. The challenge of a lieutenant filling the shoes of a more senior officer overshadows the frustrations of the limited opportunity to practice real engineering and of inexperience in management.

Statement of the Problem

The Air Force has a well documented retention problem with engineers; within CE, the captain manning has averaged about sixty percent since 1980 (TABLE I). Further compounding the problem, not only is skill lost from turnover of experienced CE officers, but management experience as well. Newly commissioned CE officers, trained as engineers, are generally unprepared to deal with the rigors of middle management (5:4; 7:3; 12:10; 13:16; 14:3; 15:7; 16:3).

Past studies attempted to identify relationships between job satisfaction and retention of engineers in the Air Force (7,5). These studies examined motivational factors (salary, working conditions, supervision, etc.) and job

modification as sources of the problem. Though these studies provided valuable insight to some possible solutions, other issues need investigating; such as effects of job expectations, problems with engineers being assigned management duties, and stresses created by lack of experience.

Research Objectives

The objective of this research is to examine role conflict and ambiguity as factors impacting the retention of junior CE officers (specifically, those with five years or less commissioned service). Furthermore, this study will measure specific organizational and individual variables in an attempt to identify significant job stress factors unique to Air Force civil engineering. To maximize credibility, only existing, prevalidated questionnaires will be used; the exception will be the demographics section, designed to identify specific individual variables.

Finally, by identifying such factors, this thesis hopes to provide some insights about reducing job stresses experienced by CE officers.

Research Questions:

1. Do civil engineering officers experience any significant level of role conflict and ambiguity?
2. What are the organizational factors within civil engineering that contribute to role stress?
3. What are the relevant individual factors which affect levels of role stress?
4. Is there any relationship between role stress and retention?

II. Literature Review

Introduction

The focus of this study is on the process which molds a junior CE officer's attitudes about his/her job, which in turn affect the person's career intentions. The general profile of this officer is a newly graduated second lieutenant, a degree in engineering, and little or no knowledge of the CE career field. Upon entering the active Air Force, this officer enters a new environment and a career field which may or may not require the use of engineering skills. In addition, with shortages in middle level management, this officer may have supervisory responsibilities thrust upon him/her without the benefit of any management training.

This literature review investigates the central issues affecting new CE officers. The first issue deals with the socialization process of an individual going from a civilian college student to a military CE officer. Next, the problem of being an engineering manager and supervising other engineers is discussed - an emotional issue with CE officers. The concepts of role ambiguity and role conflict are examined to provide insights to the causes and effects of job related stresses, focusing specifically on retention. The issue of retention is left for last for a specific reason; it is the end process of all issues preceeding it. Not unlike a doctor treating illnesses,

improving retention requires treating the problem and not the symptoms.

Socialization

For the new employee, the first year in an organization has proven to be the most critical period for learning. During this period the trainee is uniquely ready to develop or change in the direction of the company's expectations (6:222).

> Being thus motivated to be accepted by this new social system and to make sense of the ambiguity surrounding him, he is more receptive to cues from the environment than he will ever be again, and what he learns at the beginning will become the core of his organizational identity [6:210].

Expectations of other people in the organization in part determine an individual's behavior. In the job setting, this translates into expectations about his contributions or performance (6:208). When an individual meets the expectations of the organization, he is rewarded. If these expectations are close to that of the individual's, then that person will also achieve a sense of satisfaction for achieving his personal goal. These positive outcomes will lead to a more positive attitude toward the job (6:209).

> ... successfully meeting company expectations will not bring about internalization of high performance standards or increase in perceived job attractiveness unless the task requirements lie near the person's upper level of achievement...[6:209].

Failing to develop positive job attitudes means that he will respond primarily to external work incentives and will do only the minimum expected of him (6:222).

Engineering Manager

> ...Half the industrial executives in this country began as engineers or scientists... Two-thirds of all engineers will spend half their careers as managers... [2:101].

Traditional management practices effectively control production labor, but not professionals. Engineers and scientists are motivated not so much by economic needs as by self-esteem and self-actualization (3:37, 39). Though both groups have these needs, their means to fulfill them are significantly different (3:38; 4:134). Scientists espouse the advancement of knowledge for its own sake. They are more science- or career-oriented than organization oriented. Conflict arises between scientists and managers when management demands that research activity be focused on product development rather than as an end in itself (4:136; 7:74). Engineering, on the other hand, concerns itself primarily with the application of technology to fulfill the needs of the organization. Conflicts between engineers and managers center more on the methods of achieving an organizational goal than the dissimilarity between professional and organizational goals (3:338; 4:135). Engineers, who are more organization oriented than scientists, are more apt to accept management duties.

The placing of the engineer into the role of manager generated two problems; technical competency proved to be an unreliable indicator for selecting effective managers (3:39; 21:94), and many engineering managers developed stress as a result of constantly mediating between upper management and technical employees (6:50; 19:394; 32:35). The problem of ineffective management resulted primarily from the differences in problem solving techniques between engineers and managers (2:103; 21:94).

> While the training of the engineer typically emphasizes the reduction of all problems to terms that can be dealt with by objective measurement and established formulas based on predictable regularities... the world of management is far less exact, less regular, fuzzier, and less predictable...[3:39].

The latter problem (mediation) involves a form of role conflict. Since much of an engineering manager's job involves interpreting technical data for upper level management, he sometimes resents that he no longer is able to devote his time only to his profession (engineering). In addition, engineers feel that superior authority by a non-professional is a violation of professional pride (3:39).

> ...The greatest source of tension and disappointment for engineers is that current management methods and policies do not reflect an adequate understanding of their need orientations and expectations as professionals... [3:40].

Role Ambiguity

> Role Ambiguity is a direct function of the discrepancy between information available to a person and that which is required for adequate performance of his role [23:74].

Role ambiguity, common with managers, becomes more acute at higher levels of management (9:326; 26:149; 31:377, 384). This phenomenon developed because clear definition of duties diminish as one moves up the organization hierarchy (31:76; 31:377).

A variety of studies have found that high degrees of role ambiguity were associated with increased tension, anxiety, decreased job satisfaction, and loss of self confidence (10:123; 24:85; 28:154; 31:376). The way one copes with role ambiguity depends on two factors: personality, and the contemporaneous relationships of the person's role set (23:35). Personality traits such as self confidence and need cognition (23:87) dampen levels of experienced role stress. Moderate levels of stress therefore do not necessarily produce dysfunctional individuals; it can provide a basis for individual achievement (23:54). The goal is not to eliminate stress, but to reduce it to tolerable levels (23:382). Most researchers found that management practices associated with communication of role requirements as the strongest determinants of role ambiguity (1:264; 23:14, 75, 86, 380; 26:149; 28:151; 31:377).

> Poor communication between the new employee and his or her boss are responsible, in part, for the very substantial turnover among new hires... Even though some new employess will stay on despite their serious communication problems with their supervisors, their motivation to contribute to their organization and their job satisfaction will be low [25:13, 34].

Several variables moderate levels of experienced ambiguity: 1) organizational level which the focal person operates in (31:375), 2) ability or experience of the focal person (10:124), 3) autonomy (24:264), 4) and commitment, involvement, and satisfaction with co-workers (9:330). Since researchers focused on a variety of groups, there was little consensus about moderating variables. One study (9) attempted to resolve variances by recoding and replacing previous research instruments with a uniform measurement instrument. Mixed results of the experiment found variances in some correlations virtually eliminated, although others still remained inconclusive. Ambiguity was positive and consistently, though weakly, related to education and negatively and consistently related to commitment, involvement, and satisfaction with co-workers and promotion, boundary spanning, tenure, and age (9:330). The researchers attributed inconclusiveness of certain variables to the absence of uniform testing procedures (9:327).

Specifically dealing with retention, Fisher and Gitelson's meta analysis of 42 studies produced a mean correlation coefficient of 0.32 ($p<0.05$) between role ambiguity and propensity to leave (9:324). This relationship

was consistent with Rizzo, House, and Lirtzman's finding of 0.29 for the same variables (29:159).

Role Conflict

Role conflict is stress resulting when behaviors expected of an individual are inconsistent (10:123; 23:76; 28:155; 31:376). The difference between role conflict and ambiguity is sometimes vague because they both exhibit identical symptoms and coping behaviors:

> Emotional consequences of role ambiguity are very much like role conflict... leads to increased emotional tension, decreased job satisfaction... sense of futility... loss of self confidence [23:85].

The key difference is a matter of perception, unknown expectations (ambiguity) or incompatibility (conflict). For example, a person with vague instructions from a supervisor may develop role ambiguity stress about the expected proper performance. However, if a person already has a set perception about proper performance but is told to perform in some other manner, then stress associated with role conflict develops (23:29; 28:155). For example, a new junior officer may develop role conflict as a result of being assigned to the operations section of the squadron instead of the desired engineering design section. This same officer may develop role ambiguity stress if he/she is required to perform duties he/she was not trained for (i.e. resource or contract management), but is responsible for.

Most variables associated with role ambiguity can also relate to role conflict. They both relate to propensity to leave, satisfaction with co-workers, supervision, and involvement. In addition, both relate to boundary spanning, although role ambiguity is negatively related and role conflict, positively (9:330).

Fisher and Gitelson's meta analysis showed a positive relationship ($\bar{r}$=0.29, $p<0.05$) between role conflict and propensity to leave (9:323). Although this was not the case in Rizzo, House, and Lirtzman's study ($\bar{r}$=0.06, $p<0.05$), Sorensen's investigation of conflict of certified public accountants in organizations concluded that conflict, in professional and bureaucratic terms, results in job dissatisfaction and job migration (31:105)

Role conflict can be associated with a violation of the unity of command principle, the clear and single flow of authority from top to bottom (28:151). Authority is the power usually derived through the formal lines of the organization. Professional authority, another source of power within an organization, is the power of knowledge associated with membership of a profession (i.e. doctor, lawyer, engineer). This aspect of role conflict develops when a person perceives incompatibility between organizational policy and professional norms or ethics (28:151).

The junior CE officer may not be able to cope with accepting less than optimal designs, forced on him/her, as a result of the bureaucratic operation of the military acquisition and construction system.

Improved communication can provide the solution for dealing with role ambiguity. Role conflict, however, requires the resolution of differences.

> The essence of this principle is that the structure of the organization should keep a member from being caught in a crossfire of incompatible orders or incompatible expectations from more than one supervisor [28:150].

In summary, Barton (5), Thompson (32), and Clayton and Mercer (7) found many organizational factors related to retention. From this literature review, most of those same factors identified by researchers independently are also commonly associated with role stress. The questions remaining are: what are the specific factors contributing to role stress in civil engineering, and can role stress be related to retention?

III. Methodology

Introduction

The objective of this research effort was accomplished through the administration of a survey to a world wide random sampling of junior Air Force CE officers. A survey was considered the most direct way of measuring CE officer attitudes role stresses and intentions to stay in or leave the Air Force.

The purpose of this chapter discuss the methodology by which the investigation of Role Ambiguity and Role Conflict of Junior Civil Engineering Officers was analyzed. This will be accomplished in two steps. First, the contents of the survey and population sampling will be discussed. Then, the various analytical techniques used in the analysis will be presented.

Justification

The methods for measuring correlates to role ambiguity and conflict vary significantly, thus are subject to criticism about significance and validity (9:320). To remedy the problem, Fisher and Gitelson (9) used meta analysis procedures on 43 past studies to standardize methodologies. They were successful in calculating specific population estimates of correlations with a significance of 0.05. Furthermore, they found consistency with certain measuring instruments such as Rizzo, House, and Lirtzman's survey to

measure role ambiguity and conflict (9:327), and recommended future research be directed to using only validated instruments (9:328). Lastly, they suggested coding a variety of characteristics (of the group) in an attempt to discover new moderator variables (9:328).

Without exception, all studies on role ambiguity and conflict used surveys for all or part of the data collection. Misinterpretation of some survey questions by respondents is an unavoidable problem, but the cost of interviews to clarify questions often is not economical. The only feasible solution requires both care in design, and the use of a pre-test to identify problems beforehand.

Construct validity can best be maximized by using instruments validated independently by reputable researchers. This study will maximize construct validity by using only validated instruments and methodologies wherever feasible. However, the investigation of new moderating variables may cause the study to deviate slightly from the validated instruments. Every group under study has unique characteristics which may or may not apply to the general population; these characteristics are the moderating variables which determine levels of role ambiguity and conflict within the CE organization.

The dependent variables used in this study were role ambiguity and role conflict. The independent variables, the key attitudal variables, were measured using existing instruments (TABLE III). The moderating variables were used

to study correlations between role stress and characteristics unique to CE junior officers; the data for the moderating variables will come from the demographic portion of the survey.

TABLE III

Variables and Respective Measuring Instruments

KEY VARIABLES	INSTRUMENT
1. Role Ambiguity & Conflict:	Rizzo, House, and Lirtzman (1970)
2. Organizational Commitment:	Mowday, Steers, and Porter (1979)
3. Job Involvement (importance):	Lodahl and Kejner (1965)
4. Job Satisfaction: (work, pay, supervsion, coworkers, promotion)	Smith, Kendall, and Hulin (1969)

MODERATING VARIABLES	INSTRUMENT
1. Age	Demographic Section
2. Education Level	
3. Type of Degree	
4. Professional Continuing Educ. (CE Orientation Course)	
5. Professional Military Educ. (Squadron Officer School)	
6. Rank	
7. Source of Commission	
8. Years of Commissioned Service	
9. Tenure	
10. Prior Military Experience	
11. Work Differential Index	

Population

This team surveyed a random sample of 400 CE officers with five or fewer years of commissioned service. The Air Force population for this group was about 1400 officers. The random sample was selected from the Military Personnel Center (MPC) personnel data bank using the 55XX AFSC, commissioning date of February 1979 or later, and the last digit of one's social security numbers as flags. By restricting the last digit as a 1, 3, or 5, the desired sample size was achieved; only three tenths of the target population (about 400 officers) was flagged by the computer.

Sample size was based on the researchers' estimate of the worst return rate expected - 25%. This conservative estimate was based on the length of the survey instrument: 6 pages and 146 variables. The researchers wanted, under the worst conditions, to work with at least 100 cases, to assure statistical significance.

> Regarding the sample size question, the researcher generally would not factor analyze a sample of less than 50 observations, and preferably the sample size should be 100 or larger [17:219].

Analysis Techniques

The survey was composed of four pre-validated questionnaires, each using Likert scales of measurement (ordinal data), and the demographics section, with ratio, ordinal, and nominal (categorical) data. As a result,

different analytical techniques were needed to extract the needed information. All computations were made using the "Statistical Package for the Social Sciences" (SPSS) subprograms. The analysis was broken into two categories: descriptive and inferential.

Descriptive. The subprogram FREQUENCIES was used for categorizing the demographic data. Certain ratio and nominal measures (i.e. age, tenure) were recoded into categories to allow easier presentation of data. Also, recoding such data allowed using the subprogram CROSSTABS. CROSSTABS provided a 2 way classification of nominal data. The researchers used this tool to search for patterns within the sample that could help validate later inferential evaluations.

Inferential. This area of analysis required three steps: 1) factor analysis, 2) reliability check, and 3) extraction of correlation coefficients.

Subprogram FACTOR was used initially to reduce the number of measures for each construct. The "R" correlation matrix was selected in order calculate correlations between measures, as opposed to "Q" matrix, which measures correlations between respondents (17:221). The "Common Factor Analysis" model was used to identify factors unique to the CE enviroment. Finally, orthogonal extraction method with VARIMAX rotation was specified, since it was exclusively used in past studies. The criteria for minimum factor loading was 0.50 or greater. This value is

considered "very significant" in social sciences and represents a less than one percent significance level for a sample size of 100 (17:232). Questions loading significantly in more than one factor were discarded to maintain statistical independence. Those questions found as both significant and independent were put through a second factor analysis and evaluated. Those questions which again met both criteria were used to design constructs used for later evaluations. The measures common to a particular factor were averaged into a single variable. Negative correlation responses were reverse coded, and corresponding questions adjusted to uniformly identify positive correlations as representing agreement with the question or construct.

Constructs were tested for reliability using the RELIABILITY subprogram, specifying Cronbach's alpha method. This method is used often in research and is equivalent to the standard Spearman-Brown split-half coefficient for dichotomous data (20:256). All variables within a given factor were evaluated as a group, and singly, to determine which specific variables, if removed, could improve general reliability of the construct (factor). The final phase of inferential evaluation, investigation of interrelationships between variables, required using the subprograms BREAKDOWN, REGRESSION, NONPAR CORR, and PARTIAL CORR. BREAKDOWN was used with the interval scale dependent variables (role conflict and role ambiguity) and nominal independent variables (demographics). The output from this subprogram

included an analysis of variance (ANOVA) table, means and standard deviations of both the population and groups within the population, and levels of significance. REGRESSION was used to derive the means and standard deviations of all interval level variables. NONPAR CORR provided the correlation coefficients between both dependent variables and all independent variables. This non-parametric subprogram was used instead of PEARSON CORR because the former does not require the data to be either normally distributed or metrically interval. PEARSON CORR generated the coefficient "Kendall's Tau", a statistic analogous to "Spearman's R", but more meaningful for data characterized by large number of ties within categories (28:289), the situation normally encountered when the ratio of cases to categories is relatively large. Also generated by this subprogram was the level of significance for each coefficient. The subprogram PARTIAL CORR (partial correlation analysis) was used to investigate the relationship between the dependent variable and two or more independent variables. This routine was used twice; once to analyze relationships which were not intuitively obvious, or contrary to role stress theory, and a second time to measure the effects of the independent variables on the role stress-retention relationship. Partial correlation analysis controls the effects of intervening variables on the dependent-independent variable pair. Although correlation analysis may indicate some relationship existing between

role stress and retention, there still remains the question of what factors (i.e. pay, work environment etc.) were involved to create this relationship. By controlling the effects of an influential factor, partial correlation analysis will reduce the original correlation coefficient proportionally, and in some cases, practically eliminate it. In such cases, one can infer that the intervening variable has some causal effect on the original relationship (26:303)

Work Differential Index

Air Force CE officers routinely perform technical (engineering), managerial, and military duties interchangeably. This team wanted to investigate if this enviroment created any form of role stress. Respondents were asked in the survey to categorize the fraction of time they spent performing work in each of the three categories. The following table was included in the demographics portion of the survey (definition of terms found in Appendix A):

ACTUAL		DESIRED	
ENGINEERING	_____	ENGINEERING	_____
MANAGEMENT	_____	MANAGEMENT	_____
MILITARY	_____	MILITARY	_____
TOTAL	100%	TOTAL	100%

An index (work differential index) was calculated using the following formula:

$$\frac{\sqrt{(ACTENG-DESENG)^2} + \sqrt{(ACTMAN-DESMAN)^2} + \sqrt{(ACTMIL-DESMIL)^2}}{3}$$

This formula eliminated the problems associated with adding positive and negative numbers together (cancelling each other out). This index represented the amount of duty time the respondent felt was spent contrary to what he/she really wanted. An index value of 0 (zero) represented the condition of total agreement with the distribution of work actually performed (no conflict); a value of 100 represented total disagreement (high conflict). This index was included with the other independent (attitudal) variables for further evaluation.

After all the pertinent data was collected, it was tabulated and compared with past related studies (used as an aid for meaningful interpretation). At this point, the data collection and manipulation, or methodology, gave way to the last and most important phase: analysis and interpretation.

IV. Report of Findings

Introduction

The survey instrument, as described in chapter III and contained in Appendix A, was sent to a random sample of 400 CE junior officers, comprising approximately 34% of the actual target population. From this sample, 285 surveys were returned; 16 had either too much missing information or were sent back unopened, so only 269 of the surveys were used to build the data base. The return rate for the survey was just above 70%; revealing a high concern by the respondents for the subject matter.

The remainder of this chapter summarizes the output of the SPSS computer analyses described in the previous chapter. First, a profile of the sample was summarized to give the reader an understanding of the composition of the responding CE officers. Next, the factor analysis section presents both the loading coefficients and the researchers' interpretations, with resultant constructs. At this point of the research, all the variables relating to the four research questions have been identified. Finally, correlation analyses were computed between the dependent and independent variables; the results were summarized in TABLE VI.

Demographic Variables

Eleven demographic variables were measured in this survey and included items such as age, education, current grade, source of commission and prior military experience. Most variables were measured using nominal scales; ordinal data such as age and tenure were recoded and categorized, for ease of presentation.

The first analysis performed was FREQUENCIES for the demographic data. This subprogram provided a breakdown of the characteristics of the survey group (TABLE V).

The work differential index (WDI) was calculated for each case and categorized for more meaningful analysis (TABLE IV).

TABLE IV

Distribution of Work Differential Index

WDI CATEGORY	RANGE (%) GREATER THAN	LESS THAN OR EQUAL	N OF CASES	%
1	0	10	103	38
2	10	20	77	29
3	20	30	35	13
4	30	40	38	14
5	40	100	16	6

TABLE V

Profile of Civil Engineering Officers Surveyed

DEMOGRAPHICS		NUMBER	% OF GROUP
AGE	under 24	39	14
	between 24 and 27	129	48
	between 27 and 30	53	20
	over 30	48	18
GRADE	2Lt	145	54
	1Lt	88	33
	CAPT.	36	13
COMM.	OTS	114	42
	ROTC	137	51
	USAFA	18	07
DEGREE	CE	132	49
	ME	33	12
	EE	36	13
	IE	31	12
	ARCH	33	12
	OTHER	4	02
EDLVL	BACHELORS	241	88
	MASTERS	28	12
CE CRS	YES	180	67
	NO	89	33
SOS	YES	35	13
	NO	234	87
PRIOR SERVICE	YES	62	23
	NO	207	77

Orthogonal Factor Analysis With Varimax Rotation

SURVEY: PART I-ROLE CONFLICT AND ROLE AMBIGUITY

Factor Identified - role conflict	LOADING
from questions -	
5. I receive an assignment without the proper manpower to complete it.	.71
10. I receive incompatible requests from two or more people.	.79
11. I do things that are apt to be accepted by one person and not accepted by others.	.60
12. I receive an assignment without adequate resources and materials to execute it.	.74

Resulting Construct: These questions all reflected very high loadings, related to the definition of role conflict as described in Chapter II, and were consistent with those obtained by Rizzo, House, and Lirtzman (28).

Factor Identified - role ambiguity	
from questions -	
1. I feel certain about how much authority I have.	-.55
2. Clear, planned goals and objectives exist for for my job.	-.58
6. I know what my responsibilities are.	-.81
9. I know exactly what is expected of me.	-.77

Resulting Construct: As cited above, consistent with findings obtained by Rizzo, House, and Lirtzman (28). Each question related to the definition of role ambiguity.

SURVEY: PART II - ORGANIZATIONAL COMMITMENT

Factor Identified - esprit de corps, pride, loyality

from questions-

1.	I talk up this organization to my friends as a great organization to work for.	.82
2.	I feel very little loyalty to this organization	-.56
4.	I find my values and the organization's values are very similar.	.65
5.	I am proud to tell others that I am part of this organization.	.80
7.	This organization really inspires the very best in me in the way of job performance.	.75
8.	It would take very little change in my present circumstances to cause me to leave this organization.	-.68
9.	I am extremely glad that I chose this organization to work for over others.	.74
10.	There's not too much to be gained by sticking with this organization indefinitely.	-.66
11.	Often, I find it difficult to agree with this organization's policies on important matters relating to employees.	-.53
13.	For me, this is the best of all possible organizations for which to work.	.84
14.	Deciding to work for this organization was a definite mistake on my part.	-.76

Resulting Construct: These items all had very high factor loadings, an indication of a very positive organizational climate. It clearly expresses pride, devotion and enthusiasm, the common elements making up esprit de corps within the group.

SURVEY: PART III - JOB INVOLVEMENT

Factor Identified - low personal involvement

from questions -

16. I used to be more ambitious about my work than I am now. .61

17. Most things in life are more important than work. .51

18. I used to care about my work, but now other things are more important to me. .85

Resulting construct: These items have a hopeless quality, as if the person who endorsed them had given up caring much about work. Question 18, which was loaded very strongly, indicated that involvement may have been present at one time but for some reason was no longer present.

Factor Identified - high personal involvement

from questions -

2. The major satisfaction in my life comes from my job. .67

5. The most important things that happen to me involve my work. .87

10. I live, eat, and breathe my job .43

Resulting Construct: These items all express high job involvement. Question 10, while not loading at .5 or greater, was added as a result of reliability analysis; this question improved the overall reliability of the construct.

Factor Identified - conscientious about job, importance of doing job correctly

from questions -

8. I feel depressed when I fail at something connected with my job. .61

19. Sometimes I'd like to kick myself for the mistakes I make at work. .57

Resulting Construct: These items express a high sense of duty toward work with guilt feelings for mistakes made.

Factor Identified - lack of desire for quality output of work

from questions -

7. I'm really a perfectionist about my work. -.70

Resulting Construct: This item was the only one loading significantly in this factor and was recoded to allow for converse interpretation of the question.

SURVEY: PART IV - JOB SATISFACTION

WORK (3 Factors Identified)

Factor 1 - quality of working environment

from questions -

5.	good	.56
6.	creative	.52
7.	respected	.52
9.	pleasant	.67
12.	healthful	.53
18.	gives sense of accomplishment	.63

Resulting Construct: All relate to the working environment; the positive loadings indicated an acceptable quality of this environment.

Factor 2 - work is frustrating and endless

from questions - 15. frustrating .55

17. endless .64

Resulting Construct: Feelings of frustration and futility about the work of the organization.

Factor 3 - stimulating work

from questions - 2. routine -.63

3. boring -.59

Resulting Construct: These items were recoded to obtain positive factor loadings, therefore reflect the opposite of the identified question.

PAY (2 Factors Identified)

Factor 1 - marginally adequate financial conditions

from questions - 1. income adequate for normal expenses -.68

2. barely live on income .72

5. insecure .59

Resulting Construct: Marginally adequate financial conditions.

Factor 2 - inadequacy of salary

from questions - 3. bad .50

6. less than I deserve .86

8. underpaid .73

Resulting Construct: Expressed feeling of being underpaid.

SUPERVISION (3 Factors Identified)

Factor 1 - negative qualities of supervision

from questions -	2. hard to please	.59
	3. impolite	.69
	5. tactful	-.66
	9. quick-tempered	.75
	11. annoying	.65
	12. stubborn	.68

Resulting Construct: Negative qualities found in one's supervisor.

Factor 2 - positive qualities of supervision

from question -	6. influential	.53
	13. knows job well	.58
	15. intelligent	.71
	18. lazy	-.74

Resulting Construct: Positive qualities found in one's supervisor.

Factor 3 - adequacy of supervision

from questions -	8. doesn't supervise enough	-.53

Resulting Construct: This item was the only question which loaded significantly on this factor. Recoding of this question meant having adequate supervision.

PEOPLE (3 Factors Identified)

Factor 1 - negative attitudes about co-workers

from questions -	2. boring	.51
	3. slow	.51
	5. stupid	.58
	13. unpleasant	.60

Resulting Construct: Negative feelings about co-workers.

Factor 2 - positive attitudes about co-workers

from questions -	1. stimulating	.53
	4. ambitious	.72
	7. fast	.63

Resulting Construct: Positive qualities associated with co-workers.

Factor 3 - high intelligence of co-workers

from questions -	8. intelligent	.67
	11. smart	.77

Resulting Construct: Feeling of high intelligence among co-workers.

PROMOTIONS (2 Factors Identified)

Factor 1 - fair advancement opportunities

from questions -	1. good opportunity for advancement	.82
	2. opportunity somewhat limited	-.73
	3. promotions on ability	.58
	5. good chance for promotions	.77

6. unfair promotion policy -.53

9. fairly good chance for promotions .59

Resulting Construct: Good opportunity for promotion; fair promotion policies.

Factor 2 - regular promotions

from questions - 7. infrequent promotions -.75

8. regular promotions .87

Resulting Construct: Acceptable frequency of promotions.

Reliability and Correlation Analysis

After constructs were identified, they were run through the subprogram RELIABILITY to extract reliability coefficients, the measure of how accurate the estimate of the true score is in a population (20:248). Following this analysis, the dependent variables, role conflict and role ambiguity, were put through a correlation analysis with the independent variables. All the data has been summarized in TABLE VI.

TABLE VI

Properties and Correlations of Variables

VARIABLE	# OF ITEMS	MEAN	STD DEV	REL	CORRELATION CONF	CORRELATION AMBIG
PART I (7 pt scale)						
1. Role Conflict	4	4.49	1.44	.81	NA	.23*
		4.27	1.60	-	NA	.10
2. Role Ambiguity	4	3.17	1.34	.78	.23*	NA
		3.19	1.29	-	.10	NA
PART II ORG. COMMIT. (7 pt scale)						
3. Esprit de Corps, Pride, Loyal.	11	4.44	1.34	.92	-.28*	-.34*
		4.38	1.31	-	-.15*	-.33*
PART III JOB INVOLVE. (7 pt scale)						
4. Low personal involvement	3	3.23	1.56	.71	.21*	.25**
		2.89	1.81	-	-.07	.19*
5. High personal involvement	3	3.66	1.69	.78	.06	-.19*
		3.31	1.60	-	.00	-.10
6. Conscientious about job	2	4.82	1.19	.42	.07	.00
		4.42	1.19	-	.17*	.06
7. Lack of concern for quality of work performed	1	3.17	1.39	NA	.08	-.19*
		2.89	1.34	-	.03	-.14*
PART IV JOB SATISF. (3 pt scale)						
WORK						
8. Quality of work environment	6	2.32	0.57	.71	-.24*	-.32**
		2.26	0.65	-	-.24*	-.28*
9. Work frustrating and endless	2	2.36	0.68	.59	.30*	.10*
		2.45	0.65	-	.15	-.04
10. Stimulating work	2	2.24	0.69	.57	-.09*	-.23*
		2.23	0.61	-	.11	-.16
PAY						
11. Marginal finances	3	1.32	0.62	.71	.24*	-.01
		1.29	0.51	-	.02	.14
12. Inadequacy of salary	2	2.05	0.90	.80	.12*	-.05
		2.14	0.92	-	.04	.07

Note: Top rows for group I - no prior military service
Bottom rows for group II - with prior military service
* $p<0.05$ ** $p<0.01$

TABLE VI (continued)

VARIABLE	# OF ITEMS	MEAN	STD DEV	REL	CORRELATIONS CONF	CORRELATIONS AMBIG
SUPERVISION						
13. Negative qualities of svsr	6	1.56	0.66	.86	.27*	.25*
		1.48	0.67	-	.24*	.13
14. Positive qualities of svsr	4	2.64	0.56	.78	-.16*	-.24*
		2.74	0.46	-	-.02	-.38*
15. Adequacy of supervision	1	1.70	0.79	.52	.21*	.24*
		1.54	0.76	-	.24*	.14
PEOPLE						
16. Neg. feeling about co-workers	4	1.30	0.50	.61	.19*	.15*
		1.32	0.55	-	.13	-.17*
17. Pos. feeling about co-workers	3	2.26	0.71	.71	-.11*	-.20*
		2.25	0.82	-	-.18*	-.23*
18. High intelligence- co-workers	2	2.72	0.60	.80	-.04	-.05
		2.62	0.70	-	-.03	-.21*
PROMOTIONS						
19. Fair advance. opportunities	6	2.11	0.73	.80	-.15*	-.21*
		2.08	0.66	-	-.02	-.17*
20. Regular promotions	2	2.22	0.89	.76	-.07	-.12*
		2.30	0.77	-	.01	-.02
DEMOGRAPHICS						
21. Age	1	25.39	2.33		.11*	-.03
					.00	.11
22. Source of commission	1				-.09*	-.04
					.08	.03
23. Type of degree	1				.04	.11*
					-.09	.07
24. Education level	1				.08	-.04
					.07	-.03
25. Attend Base CE course?	1				.12	.06
					-.26*	-.14
26. Completed SOS?	1				.08	-.01
					.06	-.03
27. Grade	1				-.01	-.03
					.07	-.03
28. Years of commission svc	1	2.39	1.33		.04	-.02
					.14	-.04
29. Months in current job	1	12.28	8.06		.11*	.01
					.24**	.16*
30. Work differential index	1				.14**	.22**
					.06	.17*
31. Career intentions	1				.18**	.25**
					.05	.20*

Note: Top rows for group I - no prior military service
Bottom rows for group II - with prior military service
* $p<0.05$ ** $p<.01$

In addition to the correlation analysis, the demographic variables were run through ANOVA to determine whether groups within a specific variable varied significantly on the amount of role stress experienced. The researchers were particularly interested in those variables having strong correlations with role stress (TABLE VII).

TABLE VII

Significance Levels from ANOVA

INDEPENDENT VARIABLE	SIGNIFICANCE AMBIGUITY (with prior service)	SIGNIFICANCE CONFLICT (with prior service)	SIGNIFICANCE AMBIGUITY (w/o prior service)	SIGNIFICANCE CONFLICT (w/o prior service)
SOURCE OF COMMISSION *	.79	.66	.76	.37
ATTENDED CE COURSE *	.23	.02	.19	.02
JOB TENURE *	.07	.05	.67	.01
AGE *	.21	.19	.16	.34
WORK DIFFERENTIAL INDEX *	.12	.75	.00	.01
DEGREE *	.38	.79	.28	.83
GRADE	.38	.77	.73	.90
CAREER INTENTIONS *	.21	.07	.00	.00
EDUCATION LEVEL *	.98	.64	.48	.28
COMPLETED SOS *	.75	.52	.58	.16

* Variables correlating with role stress from TABLE VI

Significance levels represent the probability of error for assuming that groups comprising the independent variable (IV) measure statistically different effects of the dependent variables (DV), role conflict and ambiguity. For example, for the IV "Source of Commission", the within groups are: 1) OTS, 2) ROTC, and 3) USAFA. The .79 and .76 levels of significance is interpreted as the probability of error for assuming that levels of experienced role conflict in one group was different from the others; in other words, the source of one's commission had no bearing on the amount of role conflict one may or may not experience. For the IV "Career Intentions", the groups range from "definitely staying" to "definitely leaving"; the significance level of .00 means there is a statistical difference between the amount of role stress experienced between groups electing to remain on active duty and those intending to separate, and the probability of error is less than 1%.

In summary, TABLE VI (Correlations) and TABLE VII (ANOVA) presented data indicating officers with no prior military service showed stronger relationships between variables than those officers with prior service. Specifically, the "WDI" and "career intentions" demographic variables exhibited the strongest relationships, with significance levels less than 1%. For those with prior service, "job tenure" was the only demographic variable

correlating with both role conflict and role ambiguity at significance levels of 5% or less; "attendence to CE course" and "career intentions" correlated only for role conflict at significance levels of 2% and 7% respectively.

The primary research question asked whether CE officers experienced significant levels of role stress. Regression analysis produced the means and standard deviations for each role stress variable, but gave no information regarding the distribution of responses. In order to obtain this data, each variable value was categorized to correspond with responses of the first questionnaire. Although this method distorted the exact feelings somewhat (i.e. does a value of 6.5 represent "moderately agree" or "strongly" agree ?), the general attitude remained unaffected (TABLE VIII).

This chapter summarized the essential data needed to address the research questions. Results of the partial correlation analysis are not presented in this chapter, but are addressed in the next as a post hoc method to investigate unexpected and/or intervening relationships.

TABLE VIII

Frequency of Responses to Role Stress Variables

RESPONSE CATEGORY	ROLE CONFLICT FREQ	REL%	CUM%	ROLE AMBIGUITY FREQ	REL%	CUM%
STRONGLY DISAGREE	9	3.3	3.3	6	2.2	2.2
MODERATELY DISAGREE	34	12.6	16.0	26	9.7	11.9
SLIGHTLY DISAGREE	48	17.8	33.8	41	15.2	27.1
NEUTRAL	12	4.5	38.3	13	4.8	32.0
SLIGHTLY AGREE	68	25.3	63.6	56	20.8	52.8
MODERATELY AGREE	64	23.8	87.4	93	34.6	87.4
STRONGLY AGREE	34	12.6	100.0	34	12.6	100.0

Note: Role Ambiguity responses based on recoded data

V. Analysis

In this chapter, the four research questions posed in chapter one will be answered. To provide more meaningful analysis, the sample was broken in two groups: group I represented respondents with no prior service (N=207), and group II, with prior military service (N=62). It was felt that group II respondents probably had distinct attitudes about the military from prior experiences, and biased career intentions, due to accumulated years of enlisted service. Based on these reasons, we felt justified in dividing the sample into two groups.

Question One

> Do Civil Engineering officers experience any significant levels of role ambiguity and role conflict?

Factor analysis of part I of the questionnaire produced two constructs which accounted for 48% of the common variance of the 14 item set. These constructs, role conflict and role ambiguity, were the exact same items identified by the original authors Rizzo, House, and Lirtzman (20). Their original survey contained 30 items and when factor analyzed produced the same two constructs, accounting for 56% of the common variance. Reliability for this questionnaire was very high, alpha = 0.81 for role conflict and alpha = 0.78 for role ambiguity, compared to 0.82 and 0.81 respectively, for the original study. Role

conflict was generally high for both groups I and II, with a mean of 4.49 and 4.27 respectively compared to 3.86 for the original study. Role ambiguity (based on recoded data) had means of 3.17 and 3.19 respectively compared to 4.03 for the original study. Accounting for the fact that responses were recoded for role ambiguity, the means of respondents from this study indicated a slightly higher agreement, compared to respondents of the original study, that role stresses were experienced. This information was supported by looking at TABLE VIII in chapter IV, showing 61.7% of the respondents had expressed some presence of role conflict, and 68.0%, role ambiguity.

In conclusion, evidence shows that both role conflict and role ambiguity exist in CE organizations for its junior officers.

Question Two

What are the organizational factors within civil engineering that contribute to role stress?

In this analysis three levels of relationships were established based on values of the Kendall correlation coefficients between the dependent and independent variables: "strongly correlated" when equal to or greater than .25, "moderately correlated" when greater than or equal to .15 and less than .25, and "weakly correlated" when less than .15. The lower bound, beyond which correlations generally were not statistically significant, was .10.

For group I, role conflict had strong positive correlations with "work frustrating and endless" (.30), and "negative qualities of supervisor" (.27). Role conflict moderately correlated with "marginal finances" (.24), "adequacy of supervision" (.21), "low personal involvement in job" (.21), and "negative feelings about co-workers" (.19), and weakly with "inadequacy of salary" (.12). For this same group, role conflict negatively and strongly correlated with "loyalty and esprit de corps" (-.28), moderately correlated with "quality work environment" (-.24), "positive qualities of supervision" (-.16), and "fair advancement opportunities" (-.15), and weakly correlated with "positive feelings about co-workers" (-.11).

Within this group, several factors appeared related to role conflict. What was of interest were the controllable ones. The quality of supervision apparently can either increase or reduce the levels of experienced role conflict, thus should be investigated more closely. Although "adequacy of supervision" positively correlated to role conflict, after a partial correlation analysis with both negative and positive qualities of supervision, holding constant the effects of each, the original relationship remained for negative supervision ($r = .18$, $p < .004$), but disappeared for positive supervision ($r = .02$, $p < .38$). This could be interpreted to mean that a good supervisor does not promote role conflict, while a poor supervisor does.

Finally, the other factor worth noting was "loyalty and esprit de corps" because it appears to foster attitudes which help overcome stress associated with role conflict.

For group I, factors positively and strongly correlated with role ambiguity were "negative qualities of supervisor" (.25), and "low personal job involvement" (.25). Moderate correlations were obtained with "adequary of supervision" (.24) and "negative feelings about co-workers" (.15); and a weak correlation with "work frustrating and endless" (.10). Factors negatively and strongly correlated to role ambiguity included: "loyalty and esprit de corps" (-.34), and "quality of work enviroment" (-.32). Factors moderately correlated were: "positive qualities of supervisor" (-.24), "stimulating work" (-.23), "fair advancement opportunities" (-.21), "positive feeling about co-workers" (-.20), "conscientious about job" (-.19), and "lack of desire for quality output" (-.19). A factor which correlated weakly with role ambiguity for this group was "regular promotions" (-.12).

Group II, those with prior military service, did not have as many significant job related factors as the first group. An ANOVA test showed no significant difference between the amount of role conflict and role ambiguity experienced by either group. Therefore, having prior military experience does not make an individual less susceptible to role stress.

What job factors did correlate with role stress, and were they different from the first group? Role conflict correlated positively at moderate levels with "job tenure" (.25), "negative qualities of supervisor" (.24), and "adequacy of supervision" (.24). Negatively correlated variables were: "quality of work environment" (-.25), "positive feelings about co-workers" (-.18), and "loyalty and esprit de corps" (-.15).

As mentioned earlier, the relationship between role stress and adequacy of supervision differed, depending on the effect of the perceived qualities of one's supervisor. With respect to the negatively correlated variables, they were essentially the same as for the first group.

The only group II variable correlating positively role ambiguity was "low personal job involvement" (.19). Negatively and strongly correlated factors were: "positive qualities of supervisor" (-.38), "loyalty and esprit de corps" (-.34), and "quality of work enviroment" (-.28). Moderately correlated factors included "positive feelings about co-workers" (-.23), "high intelligence of co-workers" (-.21), "fair advancement opportunities" (-.17), and "negative feelings about co-workers" (-.17).

The strongest relationships between role ambiguity and job related factors was the perceived positive qualities of one's supervisor. This finding was consistent with the hypothesis that the supervisor was key to moderating levels of role ambiguity. Furthermore, since "loyalty and esprit

de corps", and "positive work environment" were consistently found together with "positive qualities of supervisor" in both groups and both types of role stress, it appears that a good supervisor can not only reduce role stress directly, but promote positive attitudes about the organization and work environment, which in turn, also reduce the effects of role stress.

Many job related factors correlated to both role ambiguity and role conflict. Apparently, with the nature of the work performed in CE squadrons, it may be difficult to distinguish between "incompatible demands" (conflict), and "unknown expectations" (ambiguity). An important conclusion was the observation that attitudes about poor supervision appear to foster role stresses, while attitudes about good supervision, positive working environment, and esprit de corps, reduce them.

Question Three

What are the relevant individual factors which affect levels of role stress?

Most individual factors did not correlate with either role conflict or role ambiguity. Some variables correlating weakly were: age, source of commission, type of degree, and completion of SOS. Also, ANOVA analysis showed no significant difference within groups relating to levels of role stress.

Attendance to the CE orientation course was negatively correlated with both role conflict ($r = -.26$, $p<.01$) and role ambiguity ($r = -.14$, $p<.10$) for those respondents with prior military service. ANOVA between each form of role stress and attendence to CE course showed only role conflict being significantly related; those within this group who attended the course appeared to experience significantly lower levels of role conflict compared to those who didn't attend. For the other group (without prior service), attendence correlated weakly with role conflict ($r = .12$, $p<.02$) and insignificantly with role ambiguity ($r = .06$, $p<.15$). Generally, this factor was not important in moderating levels of role ambiguity for either group, and was only significant for moderating role conflict for respondents with prior service.

Job tenure correlated positively with role conflict for both groups (.11, .24 for group I and II respectively); however, the differences within each group was only significant for those with prior service. One possible interpretation was that role conflict develops at some point in time and remains constant for group I, while intensifying for group II. The latter group, having had prior military experience, appears to be more sensitive to the cumulative effects of "incompatible demands". Role ambiguity weakly, and positively correlates with tenure only for group II ($r = .14$, $p<.07$). The cause of these relationships can only be speculated, but it suffices to caution supervisors about

keeping individuals too long in any particular job.

The WDI loaded positively and moderately with role conflict for only group I ($r = .14$, $p < .01$). This group (no prior military service) appeared to be sensitive to perceived differences between the actual and desired distribution of duties. Those with prior military experience appeared to more readily accept the reality of performing engineering, management, and military duties, in any proportion, within the organization. For group I, the WDI positively and moderately correlated with role ambiguity ($r = .22$) and the ANOVA indicated that a difference in experienced role ambiguity existed among the groups comprising the WDI variable ($p < .001$). Group II did not exhibit such a relationship ($r = .17$, $p < .12$); although role ambiguity did correlate moderately with the WDI, the intensity of role ambiguity experienced did not vary significantly among groups expressing either high or low WDI scores. Again, group I appeared more sensitive to perceived differences between desired and actual work performed; perhaps the requirement of having to perform three different types of duties intensified the effects of role ambiguity for those officers without prior service.

The WDI reflected an individual's degree of discord regarding the work he/she was performing in relation to what was desired. Though such an attitude was preconceived, with proper supervision, and a positive work environment, it can be changed to conform more to that of the organization. In

the context of the military, this equates to promoting the concept of "officer first, engineer second".

Question Four

Is there any relationship between role stress and retention?

Career intentions (propensity to leave) correlated positively and strong to moderately with role conflict (r=.18) and role ambiguity (r=.25) within group I. The ANOVA showed that levels of stress (both conflict and ambiguity) significantly differed (p<.001) within the subgroups of career intentions, with a positive relationship existing between the amount of role stress experienced and propensity to leave. For group II, career intentions did not correlate significantly with role conflict (r=.05); for role ambiguity it correlated strongly and positively (r=.20) however, ANOVA indicated that there were only slight differences (p<.21) of experienced role ambiguity among the subgroups comprising career intentions. Comparing both groups, group I showed a stronger relationship between role stess and career intent. This may be due to the fact those in group II (respondents with prior military service) were willing to put up with role ambiguity stress for the sake of remaining on active duty until retirement.

Partial correlation analysis (PCA) provided some insights to possible organizational causes leading to separation due to experienced role stress. As mentioned previously, PCA measured the relationship between the role

stress-retention variable pair while controlling for the effects of one or more independent variables. Since analysis showed that respondents with prior service were not inclined to separate due to role stress, the remainder of this discussion is limited to those officers with no prior service. For both forms of role stress, "loyalty and esprit de corps" had the strongest effect in terms of reducing the stress-retention relationship; partial r for ambiguity was reduced from .31 to .14 (55%) and, for conflict, from .28 to .10 (64%). The next most influential factor was "fair promotion policy", partial r reduced 35% and 32% for ambiguity and conflict respectively. This could either be interpreted as a sense of futility for the officer rating system, or impatience with the current promotion system. In any case, there is little a commander can do to control this attitude. Other factors affecting this relationship were: 1) "quality of working environment", 2) "stimulating work", and 3) "low job involvement". Although one cannot establish definite conclusions with PCA analysis, causal inferences can be made regarding how the quality of the working environment affects levels of role stress experienced, which in turn affects one's propensity to leave.

In summary, junior CE officers did experience varying degrees of role stress. Within the organization, the quality of supervision plays a key role in either reducing or aggravating role stress. Also, those with no prior service were more sensitive to the job satisfaction factors "frustrating work", salary, and feelings about co-workers. Loyalty and esprit de corps played an important role in reducing the effects of role stress. Finally, role stress did relate to one's propensity to leave, with some exception for those with prior military service committed to stay until retirement.

VI. Conclusions, Limitations, and Recommendations

Conclusions

This research effort found that role conflict and ambiguity stresses did exist within the Air Force for junior CE officers, although levels of experienced stresses were slightly lower for officers with prior military experience (group II).

Different moderating variables affected the levels of role stress felt by both groups; group I had more factors correlating with role stresses and appeared to be more sensitive to the nature of work performed, finances, advancement opportunities, and the quality of supervision received. Group II, because of their previous experience and knowledge of the operation and management policies of the Air Force, did not have as many significantly correlated factors.

Both groups showed a positive correlation between retention and role stress, with a significant difference within groups relating to the amount of stress experienced and the propensity to leave the Air Force. However, those respondents with prior military service appeared more willing to tolerate role stresses and not separate, possibly because of the fear of losing retirement eligibility. For those respondents with no prior military service, the organizational factor "loyalty and esprit de corps" had the strongest moderating effect on the role stress-retention

relationships, followed by promotion policies, quality working environment, and low job involvement; for those with prior military service, only the first factor had any significant moderating effect.

Recommendations for the Field

Engineers (both civilian and military), prior to being put into supervisory positions, should receive some training to help them manage junior CE officers more effectively. Literature concerning engineer-managers indicated that technical competence was not a reliable predictor of good management abilities. Analysis in this study demonstrated that role stress consistently related to "negative qualities of supervisor" (hard to please, impolite, stubborn etc.). Looking at the variables making up the "negative qualities of supervisor", all were related to personal characteristics, not technical competence, leading one to conclude that junior CE officers perceive poor managers/supervisors as primarily insensitive.

Supervisors need to understand the important role in developing job related attitudes and a quality working environment for subordinates. Esprit de corps should be encouraged; it was an effective means of reducing job related stresses and fostering loyalty to the organization; this job satisfaction factor had the strongest (negative) relationship to role stress. Partial correlation analysis also demonstrated this factor being the most influential in

terms of improving retention related to role stress, reducing the effect of stress by an average of 60%. Tied with this factor was the need for a quality working environment; attributes of this factor include "pleasant", "gives sense of accomplishment", and "respected". A related factor was "stimulating work"; it could also be interpreted as "challenging work". One can infer from these factors that junior officers were generally loyal and hard working but expect challenging and meaningful jobs, perhaps as compensation for job related stresses.

The Work Differential Index reflected a person's discord about the distribution of work between engineering, management, and military duties. Although it is not feasible to assign every CE officer the exact position he/she aspires, a supervisor should avoid arbitrarily assigning duties without knowing what the officer's aspirations are. Some CE officers prefer management related duties; they would be no less upset assigned to a design section as one prefering design would be given management duties. Junior officers without prior military service were especially sensitive to the WDI, having shown higher correlation coefficients for the WDI with both role conflict and role ambiguity than those having prior military service ($r=.17$ and $.22$ vs $r=.06$ and $.14$ respectively). In addition, ANOVA revealed that those with prior military service showed no significant difference (role conflict, $p<.75$ and role ambiguity, $p<.12$) in the levels of experienced role stresses

and WDI scores. For those without prior military service, the differences were significant (role conflict, $p<.01$ and role ambiguity, $p<.001$), possibly reflecting this group's difficulties in assimilating the myriad of responsibilities levied on them. This is a reasonable conclusion in light of the need by commanders, as a result of the shortage of experienced middle level managers, to assign lieutenants duties normally carried out by more senior officers. Interestingly, officers with prior military experience, having had lower correlation coefficients between the WDI and role stresses than officers without prior military service, appeared to not have been affected as much by perceptions of how work should be distributed. Perhaps as a result of prior experience, they were more prepared than their unexperienced counterparts for coping with the ambiguities and rigors associated with the Air Force civil engineering mission. As long as commanders are forced to give junior officers middle management responsibilities, the concept of "officer first, engineer second" needs to be asserted more emphatically, especially during the critical initial years of a CE officer's career. Going in hand with "esprit de corps", promoting officership may be an effective tool for transforming perceptions of ambiguous jobs into challenging ones.

Supervisors should avoid keeping CE officers in any one job position too long. Correlation analysis showed a moderate and positive relationship between "job time" and

role conflict. Also, officers with prior military service appeared more sensitive (r=.24 vs r=.11) than the unexperienced ones. Although this factor had no affect on the stress-retention relationship, commanders/ supervisors should be aware that tenure does have negative side effects on some officers.

Finally, attendance at the Base Civil Engineering orientation course had mixed effects on levels of role stress experienced by the respondents. The group with prior service benefitted more than their counterparts (r=-.26 vs .12 for conflict, r=-.14 vs .06 for ambiguity) by attending. Although this course was designed to clarify the CE mission for new officers, it's effect on reducing role stresses was limited to officers with prior service. Similarly, attending Squadron Officer School had no significant effect for reducing either form of role stress; likewise for source of commission, type of degree, and level of education. In general, factors external of the CE organization had negligible effect in combating job related stresses.

Assumptions and Limitations

Population. The Manpower Personnel Center computer listing of junior CE officers was assumed current and correctly represented the actual population; likewise, the recipient selection process was truely random to accurately reflect the population's attitudes. The self imposed

restriction to only survey CE officers with five years or less years of commissioned service was based on researchers' assumption that this group accurately represented individuals serving their initial service commitment, this study's operational definition of "junior" officer. Researchers subjectively divided the sample into two groups, those with prior military service and those without, on the basis that the former group had different attitudes and career intentions. This assumption was based on the belief that junior officers with prior experience not only have preconceived attitudes about the military in general, but also have so much service time accumulated that their career intentions are driven primarily by the retirement incentive; they will tend to stay in the Air Force almost irregardless of any job-related factor.

Data. Basic assumption was that answers were marked correctly and each survey recipient responded independently, with no influences from either other recipients or other individuals. All Likert scale measures were treated as interval level data; a necessary condition for factor and reliability analyses. The demographics data were numerically coded to give responses the metric quality of ordinal data. Both data transformation assumptions are valid techniques within the purview of behavioral sciences (26:288, 302, 399). Finally, all SPSS programs were considered internally valid; outputs actually reflected the statistical routines listed in the SPSS manual.

Factor Analysis. Researchers generally have two models to choose from, principal-component (PC) and common factor (CF); selection depends the analyst's objectives. PC is generally used with pre-validated surveys, the underlying assumption being that the validation process essentially reduced error variances to only randomness. CF analysis is used as a research tool to identify constructs represented in the original variables; no assumption is made regarding the distribution of variance. This thesis team chose CF analysis, even when using the prevalidated surveys. Their justification was that CF analysis would allow them to identify factors unique to CE organizations; using PC analysis would limit their study to "generic" factors created during the validation process, thus eliminate much of their original research objective.

Partial Correlation Analysis. This routine measures the relationship between a dependent variable and two or more independent variables. The underlying assumption for this analysis is that the variables have a linear relationship. Since researchers selected only highly correlated variables (based on zero order partials; Appendix B), this assumption was not violated within reasonable limits.

Recommendations for Further Study

The three most important factors affecting role stress were esprit de corps, qualities of supervisor, and quality working environment. Limited by scope and time, this thesis was unable to study in more detail the dynamics of these factors.

Loyalty and esprit de corps had by far the greatest influence in terms of controlling job stress and its effect on retention. In light of the Air Force's "Project Warrior" program, this phenomenon would be worthwhile investigating. Specifically, what fosters such attitudes? What can commanders do within their organization to promote officership and that spirit of comraderie normally associated with being part of the military?

This thesis pointed out that a supervisor's characteristics, rather than technical competence, influenced subordinates' perceptions. Some basic attributes were identified, but not enough for definitive description. Since qualities of a supervisor play an important part in moderating levels of role stress for subordinates, this topic should be pursued in more detail. A study profiling both bad and good supervisors would provide insights on improving the overall quality of management.

Respondents routinely reported work as either "stimulating" and "creative", or "frustrating" and "boring". This study was unable to determine if job type was a contributing factor for such attitudes. Barton in 1981 (5), investigating job redesign in CE organizations, made recommendations about improving the quality of work within specific jobs. This team recommends either a follow up Barton's thesis or one investigating if relationships exist between job satisfaction, type of job performed, and effect of supervisor on both.

In closing, these recommendations were no means intended to be exhaustive; they represented only the problem areas the thesis team felt were both relevant and realistic. The importance of this thesis, and the recommendations for further research, is underscored by the fact that factors related to role stress and retention, unlike pay or bonuses, are (organizationally) controllable.

Appendix A: Survey Instrument

8 May 1984

LSH/ Capt. C. Howell/ Capt. J. Konyha/ AUTOVON 785-4437

Junior Civil Engineering Officer Job and Stress Perception

Survey Recipient

1. The purpose of this research is to examine junior Civil Engineering Officers' perception of their job and the stress they must deal with in that job. Individual attitudes about different aspects of the work enviroment play an important role in determining whether stresses develop. The goal of our research is to identify those stress-inducing job factors unique to junior Civil Engineer Officers. Your frank and sincere cooperation will aid immeasurably to better the understanding about creating more rewarding and satisfying work enviroments.

2. Please provide an answer or comment for each question. Headquarters USAF Survey Control Number 84-38 has been assigned to this questionnaire. Your participation in this research is voluntary.

3. Your responses to the questions will be held confidential. Please remove this cover sheet before returning the completed questionnaire. Please return the completed survey in the attached envelope within one week after receipt. Thank you for your assistance.

LARRY L. SMITH, Colonel, USAF
Dean
School of Systems and Logistics

2 Atch
1. Questionnaire
2. Return Envelope

CIVIL ENGINEERING OFFICER JOB PERCEPTIONS

INSTRUCTIONS: PLEASE CIRCLE THE NUMBER CORRESPONDING TO YOUR DEGREE OF AGREEMENT/DISAGREEMENT WITH EACH STATEMENT, USING THE SCALE BELOW.

PART I- ATTITUDES ABOUT WORK (Rizzo, House, & Lirtzman)

STRONGLY DISAGREE	MODERATELY DISAGREE	SLIGHTLY DISAGREE	NEITHER DISAGREE OR AGREE	SLIGHTLY AGREE	MODERATELY AGREE	STRONGLY AGREE
1	2	3	4	5	6	7

1	I feel certain about how much authority I have.	1	2	3	4	5	6	7
2	Clear, planned goals and objectives exist for my job.	1	2	3	4	5	6	7
3	I have to do things that should be done differently.	1	2	3	4	5	6	7
4	I know that I have divided my time properly.	1	2	3	4	5	6	7
5	I receive an assignment without the proper manpower to complete it.	1	2	3	4	5	6	7
6	I know what my responsibilities are.	1	2	3	4	5	6	7
7	I have to buck a rule or policy in order to carry out an assignment.	1	2	3	4	5	6	7
8	I work with two or more groups who operate quite differently.	1	2	3	4	5	6	7
9	I know exactly what is expected of me.	1	2	3	4	5	6	7
10	I receive incompatible requests from two or more people.	1	2	3	4	5	6	7
11	I do things that are apt to be accepted by one person and not accepted by others.	1	2	3	4	5	6	7
12	I receive an assignment without adequate resources and materials to execute it.	1	2	3	4	5	6	7
13	Explanation is clear of what has to be done.	1	2	3	4	5	6	7
14	I work on unnecessary things.	1	2	3	4	5	6	7

PART II - ORGANIZATIONAL CLIMATE (Mowday, Steers, & Porter)

STRONGLY DISAGREE	MODERATELY DISAGREE	SLIGHTLY DISAGREE	NEITHER DISAGREE OR AGREE	SLIGHTLY AGREE	MODERATELY AGREE	STRONGLY AGREE
1	2	3	4	5	6	7

1	I talk up this organization to my friends as a great organization to work for.	1	2	3	4	5	6	7
2	I feel very little loyalty to this organization.	1	2	3	4	5	6	7
3	I would accept almost any type job assignment in order to keep working for this organization.	1	2	3	4	5	6	7
4	I find my values and the organization's values are very similar.	1	2	3	4	5	6	7
5	I am proud to tell others that I am part of this organization.	1	2	3	4	5	6	7
6	I could just as will be working for a different organization as long as the type of work is similar.	1	2	3	4	5	6	7
7	This organization really inspires the very best in me in the way of job performance.	1	2	3	4	5	6	7
8	It would take very little change in my present circumstances to cause me to leave this organization.	1	2	3	4	5	6	7
9	I am extremely glad that I chose this organization to work for over others I was considering at the time I joined.	1	2	3	4	5	6	7
10	There's not too much to be gained by sticking with this organization indefinitely.	1	2	3	4	5	6	7
11	Often, I find it difficult to agree with this organization's policies on important matters relating to employees.	1	2	3	4	5	6	7
12	I do care about the fate of this organization.	1	2	3	4	5	6	7
13	For me this is the best of all possible organizations for which to work.	1	2	3	4	5	6	7
14	Deciding to work for this organization was a definite mistake on my part.	1	2	3	4	5	6	7

PART III - IMPORTANCE OF JOB (Lodahl & Kejner)

STRONGLY DISAGREE 1	MODERATELY DISAGREE 2	SLIGHTLY DISAGREE 3	NEITHER DISAGREE OR AGREE 4	SLIGHTLY AGREE 5	MODERATELY AGREE 6	STRONGLY AGREE 7

1	You can measure a person pretty well by how good a job he does.	1	2	3	4	5	6	7
2	The major satisfaction in my life comes from my job.	1	2	3	4	5	6	7
3	For me, the mornings at work really fly.	1	2	3	4	5	6	7
4	I usually show up at work a little early, to get things ready.	1	2	3	4	5	6	7
5	The most important things that happen to me involve my work.	1	2	3	4	5	6	7
6	Sometimes I lie awake at night thinking ahead to the next day's work.	1	2	3	4	5	6	7
7	I'm really a perfectionist about my work.	1	2	3	4	5	6	7
8	I feel depressed when I fail at something connected with my job.	1	2	3	4	5	6	7
9	I have other activities more important than my work.	1	2	3	4	5	6	7
10	I live, eat, and breathe my job.	1	2	3	4	5	6	7
11	I would probably keep working even if I didn't need the money.	1	2	3	4	5	6	7
12	Quite often I feel like staying home from work instead of coming in.	1	2	3	4	5	6	7
13	To me, my work is only a small part of who I am.	1	2	3	4	5	6	7
14	I am very much involved personally in my work.	1	2	3	4	5	6	7
15	I avoid taking on extra duties and responsibilities in my work.	1	2	3	4	5	6	7
16	I used to be more ambitious about my work than I am now.	1	2	3	4	5	6	7
17	Most things in life are more important than work.	1	2	3	4	5	6	7

STRONGLY DISAGREE 1	MODERATELY DISAGREE 2	SLIGHTLY DISAGREE 3	NEITHER DISAGREE OR AGREE 4	SLIGHTLY AGREE 5	MODERATELY AGREE 6	STRONGLY AGREE 7

18 I used to care about my work, but now other things are more important to me now. 1 2 3 4 5 6 7

19 Sometimes I'd like to kick myself for the mistakes I make at work. 1 2 3 4 5 6 7

PART IV - ATTITUDES TOWARD JOB (Smith, Kendall, & Hulin)

Please mark a "Y" for yes or an "N" for no next to each word as it applies to your job. If unsure, mark "?".

WORK	SUPERVISION	PEOPLE
__fascinating	__asks my advice	__stimulating
__routine	__hard to please	__boring
__satisfying	__impolite	__slow
__boring	__praises good work	__ambitious
__good	__tactful	__stupid
__creative	__influential	__responsible
__respected	__up-to-date	__fast
__hot	__doesn't supervise enough	__intelligent
__pleasant	__quick-tempered	__easy to make enemies
__useful	__tells me where I stand	__talk too much
__tiresome	__annoying	__smart
__healthful	__stubborn	__lazy
__challenging	__knows job well	__unpleasant
__on your feet	__bad	__no privacy
__frustrating	__intelligent	__active
__simple	__leaves me on my own	__narrow interests
__endless	__around when needed	__loyal
__gives sense of accomplishment	__lazy	__hard to meet

PAY	PROMOTIONS
__income adequate for normal expenses	__good opportunity for advancement
__barely live on income	__opportunity somewhat limited
__bad	__promotion on ability
__income provides luxuries	__dead-end job
__insecure	__good chance for promotion
__less than I deserve	__unfair promotion policy
__highly paid	__infrequent promotions
__underpaid	__regular promotions
	__fairly good chance for promotion

PART V - DEMOGRAPHIC DATA

INSTRUCTIONS: PLEASE CIRCLE APPROPRIATE ANSWER, UNLESS OTHERWISE SPECIFIED.

1. Age, in years _____

2. Source of commission ROTC OTS USAFA/SVC ACADEMY

3. Type of degree CE ME IE EE ARCH
OTHER(please specify)_____

4. Highest education level Bachelors Masters Doctorate

5. Attended Base CE orientation course? yes no

6. Completed Squadron Officer School? yes no

7. Current grade O-1 O-2 O-3

8. Total years of commissioned svc 1 2 3 4 5 6
(round to nearest year)

9. Prior military experience? yes no

If you answered "no" to the last question, go to item 10.
If you answered "yes" to the last question, please continue.

9A What branch of service? _____
9B How many years? _____
9C What career field(s)? _____

10. Number of months in current job _____
(round to nearest month)

****

DEFINITIONS:

Engineering: duty requiring skills of a technical degree

Management: direct supervision of personnel; includes time spent counseling, and writing APR/OER's

Military: activities such as recalls, exercises, preparation for inspections, aerobics, and mandatory briefings

Current job: position you hold as listed in unit manning roster

****

FOR THE NEXT QUESTION, PLEASE USE WHOLE NUMBERS AND INSURE EACH COLUMN TOTAL ADDS UP TO 100.

11. Amount of time spent during a typical duty day:		Actual	Desired
	Engineering	____%	____%
	Management	____%	____%
	Military	____%	____%
	TOTAL:	100 %	100 %

PART VI- FUTURE WORK PLANS

Use the rating scale given below to indicate your future work plans with respect to the Air Force.

Within the coming year, if I have my own way:

1 I definitely intend to remain with the Air Force.

2 I probably will remain with the Air Force.

3 I have not decided whether I will remain with the Air Force.

4 I probably will not remain with the Air Force.

5 I definitely intend to separate from the Air Force.

****

FINISHED! Please place your completed survey in the enclosed envelope addressed to AFIT/LSA
Thank you for your time and effort.

Appendix B: Partial Correlation Analysis, Role Stress-Retention

Correlation Coefficients
Between Role Stress and Retention

Zero Order Partial: r=0.31 r=0.28

Intervening Variable	CONFLICT 1st Order Partial	% change	AMBIGUITY 1st Order Partial	% change
Esprit de Corps, loyalty	0.14	55	0.10	64
Quality work environment	0.22	29	0.18	36
Stimulating work	0.24	23	0.22	21
Low job involvement	0.22	29	0.18	36
Fair advancement opportunities	0.20	35	0.19	32

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VITA

Captain Charles R. Howell was born on 11 July, 1949 in Evansville, Indiana. He graduated high school (Henderson, Kentucky) in 1967 and enlisted in the Air Force in December 1968. After six years of enlisted service, he separated to continue his education. Capt. Howell attended the University of Evansville, joined the Air Force ROTC program, and earned a bachelor of science degree in civil engineering in the fall of 1978. Upon graduation, he received his Air Force commission, followed shortly by an initial assignment to Luke AFB, first as a design engineer, later as chief of construction management. In 1980, Capt. Howell volunteered for, and received an overseas assignment to Andersen AFB, Guam. While at Andersen, he performed duties in the Readiness and Logistics section of civil engineering and later as chief of the engineering design section until entering the Graduate Engineering Management program, School of Systems and Logistics, Air Force Institute of Technology, in June 1983.

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VITA

Captain Konyha was born on 27 March 1953 in Battlecreek, Michigan, son of the late Sergeant First Class (US Army) Toby T. Konyha and Mary M. Konyha (nee Revesz). He attended elementary schools in United States, Canada, and Luxembourg, graduated from Augsburg American High School in 1971, and University of Detroit in 1976 with a degree in civil engineering. Upon graduation, he was commissioned and sent to Undergraduate Navigator Training at Mather AFB. After receiving his wings, Capt Konyha was assigned to the 314th Tactical Airlift Wing as a C-130 navigator. In 1980, he married Lt. Kathleen M. Black and received a joint spouse assignment to Keesler AFB. There, he was an instructor navigator and flight examiner navigator on the EC-130 aircraft of the 7th Airborne Command and Control Squadron, until entering the Graduate Engineering Management program, School of Systems and Logistics, Air Force Institute of Technology, in June 1983.

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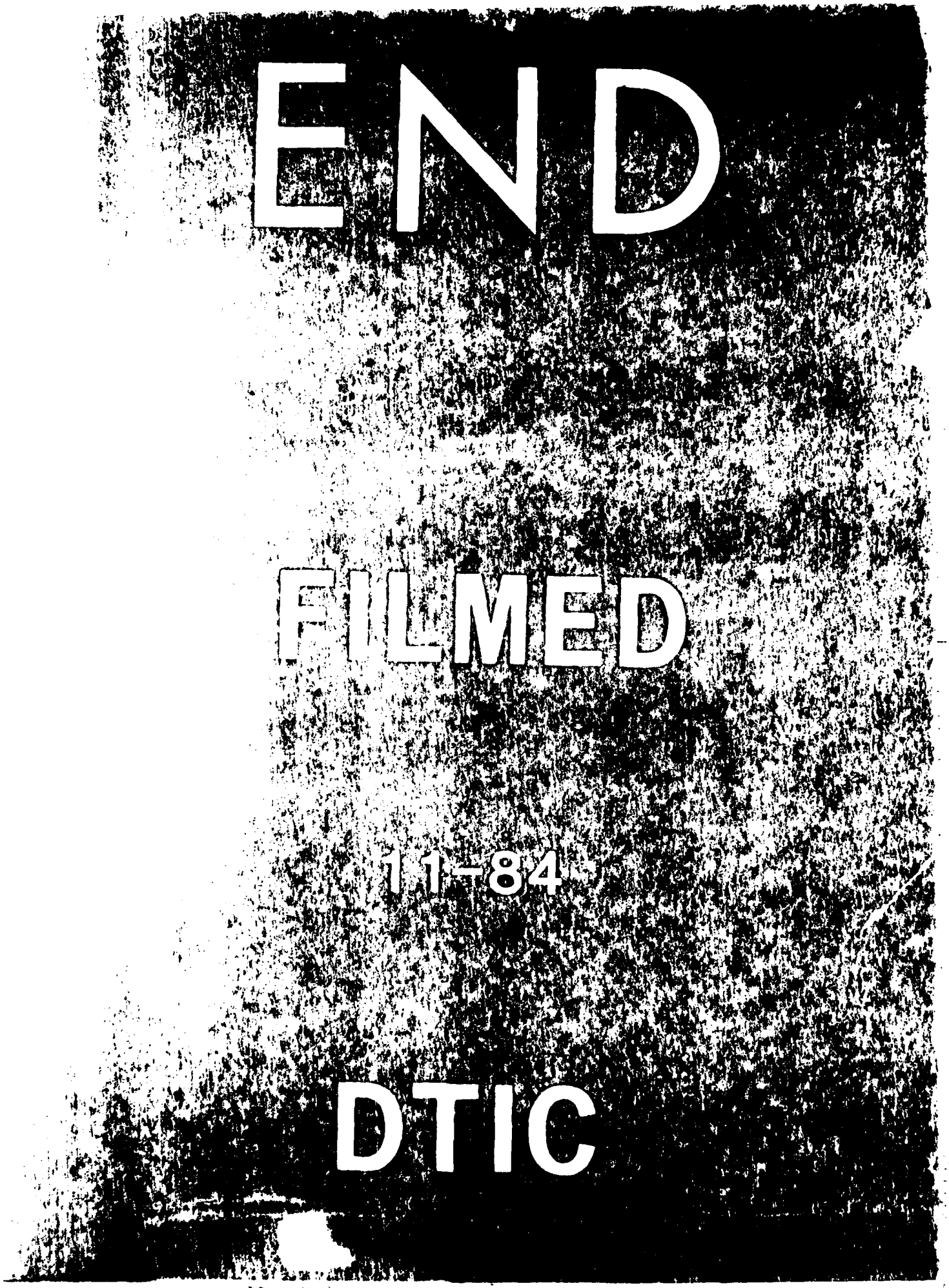
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